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# Pesticide Fact Sheet Number 136: Diphenamid

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

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b. Identifiers/Open-Ended Terms

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EPA

# Pesticide Fact Sheet

Name of Chemical: Diphenamid
Reason for Issuance: Registration Standard
Date Issued: June 24, 1987
Fact Sheet Number: 136

## 1. Description of Chemical

The following chemical is covered by this pesticide fact sheet:

| | |
|---|---|
| Common name: | Diphenamid |
| Chemical name: | N,N-dimethyldiphenylacetamide |
| CAS Number: | 957-51-7 |
| OPP (Shaughnessy) Number: | 036601 |
| Empirical Formula: | $C_{16}H_{17}NO$ |
| Trade Names: | Difenamid, Dymid, Enide®, A-831010, L-34-314 |
| Chemical Family: | Acetamide |
| Pesticide Type: | Herbicide |
| Year of Initial Registration: | 1964 |
| Registrants of Technical Products: | Nor-AM Chemical Co. |

## 2. Use Patterns And Formulations

| | |
|---|---|
| Application Sites: | Field, bush, vine, vegetable crops, fruit, citrus fruit, cotton, ornamental plants, forestry and turf. |
| Methods of Application: | Primarily applied as broadcast or banded spray by ground or aerial equipment. |
| Application Rates: | Terrestrial food crops: 2.0 to 9.0 lb., active ingredient (ai)/acre, Terrestrial non-food crops: 2.0 to 6.0 lb., ai/acre, Ornamentals and forest trees 0.50 to 1.25 lb., ai/acre. |
| Types of Formulations: | 90%, 80% & 50% (ai) wettable powder; 5% & 1.42% (ai) granular; 42.5% & 15.4% (ai) flowable concentrates. |
| Usual Carrier: | Water |

3. Science Findings

Diphenamid related effects include increased liver weights and slight histological changes in a chronic toxicity study in dogs. Except for mild liver reactions in weanlings, this chemical does not induce reproductive effects in rats. This pesticide has shown low acute oral and dermal toxicity in test animals and it is not an eye irritant. It is low in avian toxicity and slightly to moderately toxic to fish and aquatic invertebrates.

Although the present data base for diphenamid does not indicate major toxicological concerns, there are many toxicology data gaps: including acute inhalation toxicity, primary dermal irritation, dermal sensitization, subchronic dermal toxicity (21-day), chronic toxicity (rat), oncogenicity in two species, teratology in two species, mutagenicity and general metabolism studies.

In addition, the environmental fate, product chemistry, and the metabolism in food crops, in ruminants and poultry for this compound have not been characterized.

Chemical Characteristics:

Diphenamid is a white to off-white granular solid with a sweet aromatic odor at room temperature. Its melting point is 133.8-135.4° C, and its molecular weight is 239.3. Its water solubility is 0.26 g/liter in water at 25°C.

Toxicological Characteristics:

Acute Oral: Toxicity Category III - 1,373 mg/kg (rats, both sexes)
Acute Dermal: Toxicity Category III - > 6,320 mg/kg (rabbits, both sexes)
Primary Eye Irritation: Toxicity Category IV - No irritation with 0.1 ml solution (rabbits)

Chronic Toxicity:

In a 2-year dog feeding study, males and females were offered diets containing 0, 120, 400, and 1200 ppm technical diphenamid in the diet for 103 weeks. The only compound-related effects included slightly increased liver weights and a slightly increased incidence of portal macrophages and/or fibroblasts in the livers of the dogs in the 400 and 1200 ppm dose groups. The no-observed-effect level (NOEL) was determined to be 120 ppm (3 mg/kg/day) in the diet.

Human Exposure

Major routes of exposure: Applicators and mixer/loaders handling this pesticide would be exposed primarily through skin contact and inhalation.

Physiological & Biochemical Chracteristics:

Translocation: Diphenamid is absorbed by the roots and translocated through the roots, stem, and leaves.

Mechanism of pesticidal action: It inhibits growth in terminal leaves and roots.

Metabolism & Persistence in Plants & Animals: The available data are inadequate to evaluate the persistence of diphenamid in plants and animals.

Environmental Chracteristics:

Available data are insufficient to fully assess the environmental fate and potential exposure of humans and non-target organisms to diphenamid. Additional data are required to characterize the potential for diphenamid to reach ground water supplies.

Ecological Characteristics:

There is sufficient information to characterize technical diphenamid as "slightly toxic" to freshwater invertebrates: Daphnia magna ($LC_{50}$ of 58.0 ppm). Formulations containing 50% technical were classified as very low in toxicity to avian species: Bobwhite quail ($LC_{50}$ of 18,000 ppm) and Mallard duck ($LC_{50}$ of 30,000 ppm), slightly toxic to warmwater fish: Bluegill ($LC_{50}$ of 32.0 ppm) and moderately toxic to coldwater fish: Rainbow trout ($LC_{50}$ of 1.2 ppm). In an acute contact study, diphenamid was shown to be very low in toxicity to honey bees.

Endangered species

Since the registrant has voluntarily deleted the forestry use pattern for diphenamid products, endangered species labeling which would have been required under forestry uses will not be required in this Standard.

Tolerance Assessment

According to 40 CFR 180.230, tolerances for diphenamid have been approved for the raw agricultural commodities (RAC's) listed below.

| Crop | Tolerance(ppm) |
|---|---|
| Apples | 0.10 |
| Cattle, fat | 0.05 |
| Cattle, meat | 0.05 |
| Cattle, mbyp | 0.05 |
| Cottonseed | 0.10 |
| Cotton forage | 0.20 |
| Fruiting vegetables | 0.10 |
| Goat, fat | 0.05 |
| Goat, meat | 0.05 |
| Goat, mbyp | 0.05 |
| Hogs, fat | 0.05 |
| Hogs, meat | 0.05 |
| Hogs, mbyp | 0.05 |
| Horses, fat | 0.05 |
| Horses, meat | 0.05 |
| Horses, mbyp | 0.05 |
| Milk | 0.01 |
| Okra | 0.10 |
| Peaches | 0.10 |
| Peanuts | 0.10 |
| Peanut, hay & forage | 2.00 |
| Peanut hulls | 0.50 |
| Potatoes | 1.00 |
| Raspberries | 1.00 |
| Sheep, fat | 0.05 |
| Sheep, meat | 0.05 |
| Sheep, mbyp | 0.05 |
| Strawberries | 1.00 |
| Soybeans | 0.10 |
| Soybean, hay & forage | 0.50 |
| Sweet potatoes | 0.10 |

The Provisional Acceptable Daily Intake (PADI) for diphenamid is based on the 103 week dog feeding study with a NOEL of 120 ppm (3 mg/kg/day). Other toxicology data considered in suport of these tolerances include a 3-generation rat reproduction study indicating that reproductive performance was not affected at dietary intake up to and including 30 mg/kg/day. Utilizing a safety factor of 100, the PADI was calculated to be .03 mg/kg/day. A Tolerance Assessment System (TAS) printout has recently been completed which compares the PADI to the Theoretical Maximum Residue Contribution (TMRC). The theoretical dietary exposure expressed as a percentage of PADI utilized by the Theoretical Maximum Residue Contribution (TMRC) ranged from 3.8% to 11.8% of the PADI for various subgroups with 5.6% being the U.S. population average.

Additional data are required for plant and animal metabolism, analytical methods, and storage stability. Processing studies are required for potatoes, soybeans, tomatoes, apples and peanuts. Since the data required for individual commodities are dependent on metabolism data, the Agency recommends that metabolism data be obtained and submitted prior to any required residue data.

There is a Canadian tolerance of 1.0 ppm for diphenamid residues in or on strawberries but no tolerances for residues of diphenamid on the other raw agicultural commodities listed in 40 CFR 180.230. There are no Mexican tolerances or Codex Maximum Residue Levels for residues of diphenamid on the raw agicultural commodities listed in 40 CFR 180.230.

Existing tolerances for soybean hay and forage; and peanut hay are adequately supported by data. Therefore, the registrant may propose removal of the grazing and feeding restrictions currently in effect for diphenamid on soybeans and peanuts.

Reported Pesticide Incidences

The Pesticide Incident Monitoring System (PIMS) does not have any incident involving diphenamid at this time. Based upon data from California, five incidences indicating skin or eye irritation occurred from 1981 through 1985. Although four of the incidences involved applicators and one involved a non-applicator, none of these cases required hospitalization.

4. Summary of Regulatory Positions & Rationale:

-- The Agency will not place diphenamid in Special Review because diphenamid does not exceed any of the risk criteria for adverse effects in 40 CFR, Section 154.7. It does not pose a risk of serious acute injury to humans, domestic animals or avian species.

-- The Agency has determined that certain toxicological studies are required to support the reregistration of diphenamid products: acute inhalation, primary dermal irritation, dermal sensitization, subchronic dermal toxicity (21-day), chronic toxicity in rats, oncogenicity in two species, teratology in two species, mutagenicity and metabolism studies.

-- The Agency has determined that present precautionary statements for persons handling or applying diphenamid products are sufficient for the labels of manufacturing-use and end-use products. Available data indicate that diphenamid causes low oral (Category IV) and dermal (Category III) toxicities in test animals and it is not an eye irritant(Category IV). Therefore, the labeling of these products contain statements that caution persons applying or handling this compound, provide first aid instructions, and require the use of precautionary measures to ensure safe handling of the pesticide products.

-- The Agency will require the following environmental fate data necessary to support the reregistration of diphenamid: photodegradation in water and soil, mobility (leaching & adsorption/desorption), mobility [volatility (lab)], soil dissipation, rotational crops (confined) and accumulation in fish studies.

-- The Agency has determined that certain groundwater data are required. The necessary environmental fate data (aerobic and anaerobic metabolism studies) are being repeated at the present time. The Agency expects to receive these data by July 1987. Until these data are received and found acceptable by the Agency, data gaps for ground water exist.

-- The Agency has determined that reentry intervals for workers are not required for diphenamid products. The low acute toxicity of this chemical does not warrant significant concern about exposure of workers reentering treated areas, according to the criteria in 40 CFR Part 158.140.

--The Agency will require the following residue chemistry data necessary to support the reregistration of diphenamid: plant and animal metabolism, analytical methods, storage stability, and processing studies for potatoes, soybeans, tomatoes, apples, cottonseed and peanuts.

-- The Agency has determined that grazing and feeding restrictions for soybean hay and forage, and peanut hay are not required for diphenamid products because existing tolerances for these commodities are adequately supported by residue chemistry data.

--Since the registrant has voluntarily deleted the forestry use patterns for diphenamid products, endangered species labeling which would have been required under forestry uses will not be required in this standard.

--This pesticide, when applied at recommended rates, does not present unreasonable hazards to birds. Existing studies on diphenamid indicate that its dietary toxicity to avian species is very low.

5. Precautionary Statements

a. Manufacturing-Use Product Statements

All diphenamid products intended for formulation into end-use products must bear the following statements:

"Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public water unless this product is specifically identified and addressed in an NPDES permit. Do not discharge effluent containing this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA."

b. End-Use Product Statements

The following precautionary statements must appear on the following diphenamid EP labels:

1. (Non-granular)

"Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water by cleaning of equipment or disposal of wastes."

2. (Granular)

"Cover, incorporate or collect granules spilled on the soil surface. Do not contaminate water by cleaning of equipment or disposal of wastes."

6. Summary of Major Data Gaps

The following data are required for this standard.

158.120 Product Chemistry data are required during 1988.

158.125 Residue Chemistry:
- 171-4 Nature of Residue (Plant & Animal Metabolism)
- 171-4 Residue Analytical Methods
- 171-4 Storage Stability
- 171-4 Residue Studies on Crops
- 171-4 Residue Studies on Processed Food/Feed Commodities

158.135 Toxicology:
- 81-3 Acute Inhalation Toxicity (Rat)
- 81-5 Primary Dermal Irritation (Rabbit)
- 81-6 Dermal Sensitization (Guinea pig)
- 82-2 Subchronic Dermal (21-day)
- 83-1 Chronic Toxicity (Rat)
- 83-2 Oncogencity (Two species) (Mouse) Ongoing Study* (Rat)
- 83-3 Teratogenicity (Two species)
- 84-2 Mutagenicity
- 85-1 Metabolism

158.130 Environmental Fate

- 161-2 Photodegradation in Water
- 161-3 Photodegradation on Soil
- 162-1 Aerobic Soil Metabolism
- 162-2 Anaerobic Soil Metabolism
- 163-1 Mobility Studies (Leaching & Adsorption/Desorption)
- 163-2 Mobility Studies (Volatility/ lab)
- 164-1 Soil Dissipation
- 165-1 Rotational Crops (Confined)
- 165-4 Accumulation in Fish

158.145 Wildlife and Aquatic Organisms

- 71-1 Avian Oral Toxicity
- 71-2 Avian Dietary Toxicity (Two species)
- 72-1 Freshwater Fish Acute Toxicity (Two psecies)
- 122-2 Aquatic Plant Growth

7. Contact Person at EPA

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